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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/567,144

02/06/2006

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109 7590 01/16/2009

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EXAMINER

MILLER, JR, JOSEPH ALBERT

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

01/16/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|---|--|
| Office Action Summary | Application No. 10/567,144 | Applicant(s) GABELNICK ET AL. | |
| | Examiner JOSEPH MILLER JR | Art Unit 1792 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-3 and 5 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 6 and 13 of U.S. Patent No. 6,815,014 in view of Koinuma (EP 0617142 A1) and Hunt (2002/0058143). Although the conflicting claims are not identical, they are not patentably distinct from each other because in each case a perforated electrode, the use of a tetraalkylorthosilicate, a balance gas including oxygen, a glow discharge/corona plasma and moving substrate are claimed in each. Additionally, the flow velocity ranges are overlapping, the silicon compound source concentration would be obvious to vary as a matter of perfecting a

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thin film. Patent '014 does not mention the specific gas PPM range as in instant claims or the use of air (etc) as a balance gas. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the range taught by Koinuma, 33 to 10000ppm TEOS, with the method taught in '014 because it provides a range where deposition rate would be sufficiently high without entering the range where silica particles join together to form a rough, porous film (page 3, lines 22-43). Hunt teaches the formation of a silicon dioxide film using TEOS with a carrier gas comprising oxygen [0119]. It would have been obvious to someone of ordinary skill in the art at the time of the invention to apply the use of oxygen as a carrier gas as taught by Hunt to the formation of a silicon dioxide film as taught by Koinuma as one could apply the use of the oxygen gas as a carrier gas (in lieu of a gas such as nitrogen as taught by Koinuma, p4, lines12-15)) with a reasonable expectation of success / as a known alternative in formation of a silicon dioxide film based on Hunt's successful use of oxygen as a carrier gas for TEOS.

Claims 1-3 and 5 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 6 and 13 of U.S. Patent No. 6,815,014 in view of Babayan (WO00/70117). Although the conflicting claims are not identical, they are not patentably distinct from each other because in each case a perforated electrode, the use of a tetraalkylorthosilicate, a glow discharge/corona plasma, a balance gas including oxygen, and moving substrate are claimed in each. Additionally, the flow velocity ranges are overlapping, the silicon compound source

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concentration would be obvious to vary as a matter of perfecting a thin film. Patent '014 does not mention the specific silane gas PPM range or use of an oxygen source as a balance gas as in instant claims, but it would have been obvious to one of ordinary skill in the art at the time of the invention to use the range taught by Babayan, around 2000 ppm (2015 ppm) TEOS, as one could apply the TEOS concentration taught by Babayan with a reasonable expectation of success in forming a film with a high deposition rate (page 11, lines 21-25). It would have been further obvious to use oxygen as a balance gas as taught by Babayan (page 17, line 5) as oxygen-containing gases are well known in the art, in particular in applications for the formation of silicon dioxide films; one seeking to follow the process of '014 would certainly look towards other TEOS reactions to determine what gas to use as a working gas.

The TEOS concentration was calculated as represented in the table below, the total of TEOS being 2015 PPM. The flow and units(*) are as indicated in Babayan (p30).

| Gas | Flow* | Units* | Density | g/min |
|------|-------|--------|---------|---------|
| He | 42.3 | L/min | 0.1785 | 7.55055 |
| O2 | 0.85 | L/min | 1.429 | 1.21465 |
| TEOS | 17.7 | mg/min | | 0.0177 |

Though Babayan does not teach 2200 ppm, 2015ppm is “about” 2200ppm.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 5-7, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by, or, in the alternative, under 35 U.S.C. 103(a) as obvious over Babayan (WO00/70117).

Babayan teaches a method of depositing a TEOS film (page 17, lines 1-14) on a substrate using a plasma created between at least two electrodes (page 7, line 19- page 8, line 10).

Babayan teaches that the TEOS may be generated along with oxygen (i.e. “balance gas”) (page 17, line 5) and the plasma is created in the region of multiple electrodes (page 7, lines 22-24). The TEOS concentration used was greater than 2000 ppm (page 30, line 23 - page 31, line 1), with the gas speed more than 1.0 m/s (page 15, lines 8-14).

The TEOS concentration was calculated as represented in the table below, the total of TEOS being 2015 PPM. The flow and units(*) are as indicated in Babayan (p30).

| Gas | Flow* | Units* | Density | g/min |
|------|-------|--------|---------|---------|
| He | 42.3 | L/min | 0.1785 | 7.55055 |
| O2 | 0.85 | L/min | 1.429 | 1.21465 |
| TEOS | 17.7 | mg/min | | 0.0177 |

The instant claim of requirement that tetraalkylorthosilicate be at least about 2200 ppm is read on (inherently) by Babayan – there are no metes and bounds defining “about” and therefore 2015 is considered “about” 2200 ppm.

In the alternative, a TEOS concentration of 2200 ppm would be obvious over a taught concentration of 2015ppm.

According to the MPEP 2144.05, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of “having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium” as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.). “[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness.” *In re:Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

While the particular citations in the MPEP are pertaining more directly towards compositions of materials, it is reasonable to treat the composition of a gas in the same manner. Beyond that the 2015ppm (or 2003 as claimed by applicants) taught by Babayan is “about” 2200, the difference between 2003 and 2200 ppm in regards to this process would not produce results that are unexpected. Furthermore, Babayan teaches

high deposition rates of 0.05 to 10 microns/minute (p11, lines 20-25), comparable to the applicants example 1 of 1.8 micron/minute.

Regarding claim 2, Babayan teaches perforated electrode which allow gases to pass through them (page 11, lines 10-13).

Regarding claim 5, Babayan teaches TEOS.

Regarding claim 7, Babayan teaches a pressure range of 10.0 to 1000 Torr, therefore including atmospheric pressure (page 7, lines 12-14).

Regarding claim 11, Babayan does not explicitly teach the result of a surface energy of more than 50 dynes/cm, however, since the prior art and the present claims teach all the same process steps, the results of a film with surface energy greater than 50 dynes/cm by applicants process must necessarily be the same as those obtained by the prior art. As discussed, Babayan teaches forming a silicon dioxide film using a plasma created between two electrodes at atmospheric pressure using a TEOS concentration of 2015ppm, with a similar flow velocity, including oxygen, similar to applicant's process in example 4. Therefore by forming a silicon dioxide film under the conditions named, it must necessarily result in a film having a surface energy of greater than 50 dynes/cm.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as obvious over Koinuma (EP0617142A1) in view of Hunt (2002/0058143).

Koinuma teaches a method to form a silica thin film by establishing an atmospheric pressure glow discharge beam plasma using an inert gas and

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trimethoxysilane (abstract). Koinuma teaches a glow discharge plasma between two electrodes, a balancing gas (hydrogen), a carrier gas (argon), a substrate and a gas flow of 0.26 m/s (Example 1, page 4) based on a flame size of 5mm (page 3, line 24).

Koinuma discusses the volume of TEOS as compared to the carrier gas and hydrogen (page 3, lines 56 - page 4, line 11), teaching a main gas range of 200-300 sccm, and a range of silane compound source from 0.01 to 2 SCCM, the lower limitation of amount of silane source compound used being based on too low of a deposition rate and the upper on the point where silica particles join together and form a rough, porous film (col 3, lines 39-43). Calculating the silane precursor based on the extremes of the ranges taught by Koinuma, the silane source may be from 33 to 10,000 PPM.

Calculation based on a silane compound source at 0.01 sccm with main gas at 300 sccm (lower limit ppm) up to silane source at 2 sccm with main gas at 200 sccm (upper limit ppm).

The silane source range taught by Koinuma clearly encompasses instantly claimed range.

Regarding the limitation of a balance gas of an oxygen-containing compound as named in instant claim 1, Koinuma teaches that the reaction may occur in air (pg 4, lines 36-38) but does not specifically teach using a balance gas as described in instant claim 1.

Hunt teaches the formation of a silicon dioxide film using TEOS with a carrier gas comprising oxygen [0119].

It would have been obvious to someone of ordinary skill in the art at the time of the invention to apply the use of oxygen as a carrier gas as taught by Hunt to the formation of a silicon dioxide film as taught by Koinuma as one could apply the use of the oxygen gas as a carrier gas (in lieu of a gas such as nitrogen as taught by Koinuma, p4, lines 12-15)) with a reasonable expectation of success / as a known alternative in formation of a silicon dioxide film based on Hunt's successful use of oxygen as a carrier gas for TEOS.

Regarding claim 9, Koinuma teaches that the film is characterized by "transparency" (page 2, lines 43-46).

Claims 1, 10 and 11 are rejected under 35 U.S.C. 103(a) as obvious over Gabelnick (WO 03/066932).

Gabelnick teaches a process for creating plasma polymerized deposition on a substrate by corona discharge (abstract). Gabelnick teaches a plasma "in a spacing between the electrode and the counter electrode" (page 3, lines 10-15), flowing a mixture gas with a balance gas including oxygen (page 3, line 26 – page 4, line 3), where the mixture gas may include TEOS (page 4, lines 4-15) at a flow velocity of at least 0.1 m/s (page 4, lines 25-29).

Gabelnick teaches a TEOS concentration of "most preferably not less than 10 ppm" (p5, lines 12-20).

Though Gabelnick also teaches that the concentration is "preferably" not greater than 2000 ppm, it still would have been obvious to someone of ordinary skill in the art at

the time of the invention to apply any concentration over 10ppm based on the initial range provided. Further limitations on the preferred range do not negate the suggestion of a range (i.e. greater than 10 ppm). Furthermore, suggesting the limit of “not greater than 2000 ppm” is suggestive of 2000 ppm, which is “about 2200 ppm”.

Regarding claim 10, Gabelnick teaches that the resulting film is “optically clear” (page 5, lines 23-31).

Regarding claim 11, Gabelnick teaches a example including a resulting surface energy of greater than 50 dynes/cm (page 8, lines 20-24).

Claims 1, 10 and 11 are rejected under 35 U.S.C. 103(a) as obvious over Gabelnick (US 6,815,014) in view of Koinuma (EP 0617142 A1).

For the reasons discussed above, the examiner takes the position that the TEOS concentration taught by Gabelnick reads on that of instant claim, however, since the teaching of Gabelnick would only apply reasonably to the lower part of the 2200 to 10,000 ppm of the claimed range, the Examiner additionally provides the following.

Gabelnick teaches a process for creating plasma polymerized deposition on a substrate by corona discharge (abstract). Gabelnick teaches a plasma “in a spacing between the electrode and the counter electrode” (page 3, lines 10-15), flowing a mixture gas with a balance gas including oxygen (page 3, line 26 – page 4, line 3), where the mixture gas may include TEOS (page 4, lines 4-15) at a flow velocity of at least 0.1 m/s.

Gabelnick teaches a ppm “preferably” not greater than 2000 ppm, but does not explicitly teach a concentration of at least about 2200 ppm.

Koinuma teaches that the concentration of TEOS can range from 33 to 10000 ppm (as explained above) deposition rate would be sufficiently high without entering the range where silica particles join together to form a rough, porous film (page 3, lines 22-43).

It would have been obvious to one of ordinary skill in the art at the time of the invention to any amount of TEOS up to 10000 ppm as taught by Koinuma because it provides a range where deposition rate would be sufficiently high without entering the range where silica particles join together to form a rough, porous film (page 3, lines 22-43).

Regarding claim 10, Gabelnick teaches that the resulting film is “optically clear.” Regarding claim 11, Gabelnick teaches a example including a resulting surface energy of greater than 50 dynes/cm.

Regarding claim 11, Gabelnick teaches an example including a resulting surface energy of greater than 50 dynes/cm (page 8, lines 20-24).

Claims 2-4 are rejected under 35 U.S.C. 103(a) as obvious over Koinuma (EP0617142A1) in view of Hunt (2002/0058143).as applied to claim 1 above and in further view of Yializis (6,118,218).

Koinuma teaches a glow discharge plasma between two electrodes, a balancing gas (hydrogen), a carrier gas, a substrate and a gas flow of 0.26 m/s (Example 1, page 4). Koinuma teaches a TEOS range of 33 to 10,000 ppm. Hunt teaches the formation of a silicon dioxide film using TEOS with a carrier gas comprising oxygen [0119].

Koinuma in view of does not teach a perforated electrode wherein the treatment gas is flowed through the perforations.

Yializis teaches an atmospheric plasma treatment method forming a glow discharge plasma based on a porous electrode and a counter electrode covered by a dielectric (abstract) which may be used for chemical vapor deposition films (col 10, lines 36-41). Yializis teaches the use of a perforated electrode which allows gas to flow through the perforations (col 5, lines 47-55).

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the use of a perforated electrode taught in the atmospheric plasma treatment method of Yializis to the glow discharge plasma silica film forming method of Koinuma because the distribution allows for the ability to keep the plasma more uniform through gas feed fluctuations (Yializis, col 5, lines 50-55) and the desire for a stable plasma is well known in the plasma/deposition arts.

Regarding claims 3 and 4, Figure 4 of Yializis shows a film (item 14) to be treated which is passed on the roller/counter electrode (col 5, lines 5-15). And Yializis teaches that it is "well known" that an atmospheric plasma can be generated with the insertion of a dielectric layer between the two electrodes, where one electrode (counter) is a rotating drum (col 2, lines 10-20). It would have been obvious to one of ordinary skill in

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the art at the time of the invention to apply the use of a dielectric-coated roller as a counter electrode as taught in the plasma treatment method of Yializis to the glow discharge plasma silica film forming method of Koinuma as the dielectric coating and setup are "known" and the roller would allow a continuous feed mechanism for continuous processing (i.e. increased throughput).

Claims 1-5 and 7-8 are rejected under 35 U.S.C. 103(a) as obvious over Yializis (6,118,218) and in view of Koinuma (EP0617142A1).

Yializis teaches an atmospheric plasma treatment method forming a glow discharge plasma based on a porous electrode and a counter electrode covered by a dielectric (abstract). Yializis teaches the use of a perforated electrode which allows gas to flow through the apertures (col 5, lines 47-55).

Yializis teaches that the treatment may be used for chemical vapor deposition for barrier films in the packaging industry (col 10, lines 36-41) does not specifically teach the application of a silicon film on a substrate.

Koinuma teaches a glow discharge plasma between two electrodes, a balancing gas (hydrogen), a carrier gas (argon), a substrate and a gas flow of 0.26 m/s (Example 1, page 4) and a TEOS concentration of up to 10,000 ppm.

It would have been obvious to one of ordinary skill in the art at the time of the invention to apply the use of a tetraalkylorthosilicate gas to create a silica film via glow discharge plasma as taught by Koinuma to the atmospheric plasma treatment method

of Yializis because such silica deposited films are well known in the food wrapping and other packaging industries (Koinuma, page 2, lines 22-25).

Regarding claim 3, Figure 4 of Yializis shows a film (item 14) to be treated which is passed on the roller/counter electrode (col 5, lines 5-15).

Regarding claim 4, Yializis teaches that it is "well known" that an atmospheric plasma can be generated with the insertion of a dielectric layer between the two electrodes, where one electrode (counter) is a rotating drum (col 2, lines 10-20).

Regarding claim 5, Koinuma teaches the use of TEOS (col 3, lines 34-36).

Regarding claim 7, Koinuma teaches the use of TEOS up to 10,000 and a process at atmospheric pressure.

Regarding claim 8, Yializis teaches varying the size and shapes of the pores in the electrode, and even the use of a metal cloth to create the pores (col 6, lines 4-39). It is obvious that the flow rate through the pores (i.e. perforations) is dictated by the size, shape and distribution of the pores, as well as the gas flow rate(s). It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the dimensions of the pores to vary the gas flow velocity.

Claim 11 is rejected under 35 U.S.C. 103(a) as obvious over Koinuma (EP0617142A1) in view of Hunt (2002/0058143) as applied to claim 1 and in further view of Sloodman (5,576,076).

Koinuma teaches a glow discharge plasma between two electrodes, a balancing gas (hydrogen), a carrier gas (argon), a substrate and a gas flow of 0.26 m/s (Example 1, page 4) based on a flame size of 5mm (page 3, line 24).

Koinuma teaches a glow discharge plasma between two electrodes, a balancing gas (hydrogen), a carrier gas, a substrate and a gas flow of 0.26 m/s (Example 1, page 4. Koinuma teaches a TEOS range of 33 to 10,000 ppm. Hunt teaches the formation of a silicon dioxide film using TEOS with a carrier gas comprising oxygen [0119].

Koinuma in view of Hunt does not teach a result of the surface energy of the deposited film.

Slootman teaches a TEOS film deposited via an atmospheric glow discharge process, where the glow discharge is created using two electrodes, one which is dielectric-covered (col 1, lines 21-26; col 2, lines 48-56 and 59-65). Slootman teaches results of several experiments where the surface tension is greater than 58 dynes/cm. While the results presented by Slootman are not using the same starting precursor as taught by Koinuma, the results are indicative of the desired surface energy of such work and one may expect similar results from various sources of silicon (which are taught by Koinuma). It therefore would have been obvious to try the same experiment as taught by Koinuma in view of Slootman and determine the surface energy.

Response to Arguments

Applicant's arguments with respect to the rejections of claims 1-5 and 7-11 have been considered but are moot in view of the new ground(s) of rejection.

Arguments over double patenting rejection over Koinuma

Arguments over the double patenting rejection are moot. Applicants make multiple arguments over double patenting rejection, some of which are subsequently applied to arguments over 102/103 rejection; examiner will like-wise apply counter-arguments.

Double patenting rejection has been amended appropriately to be in view of Koinuma and Hunt (matching amendment of 103 rejection over Koinuma) based on applicants amendment of claim 1.

Applicants argue that Koinuma teaches that it is desirable to employ a higher feed rate of balance gas than working gas, but Koinuma teaches down to 0 times the feed rate of balance to working gas (page 3, bottom of page); in the double patenting rejection, Koinuma is only relied upon for suggestion of a the TEOS concentration. Applicants argue that the working concentration range taught by Koinuma, 33 to 10,000 ppm as stated in initial double patenting rejection is not applicable to the instant application/claims because Koinuma teaches that it is desirable to employ a significantly higher feed rate of balance gas than a feed rate of working gas. This argument is moot for the reasons outlined below.

1. The claimed concentrations overlap on range taught by Koinuma; the claimed flow rates are taught by Koinuma. One needs to look no further: the parameters claimed by applicant are taught by Koinuma.

2. Even though Koinuma may make a suggestion that a balance gas has a higher feed rate than the working gas, in practice the parameters of instant application and Koinuma are the same. Koinuma teaches a gas flow of 0.26 m/s (Example 1, page 4) which is in the claim 1 range of instant application, therefore the total feed rate of gas is the same as instant application and the silane source concentration is therefore applicable.

Applicants further argue that their ten-fold increase in deposition rate is unexpected, but Koinuma teaches a deposition rate of 50 – 500 Å/sec (p3, lines 53-56), within the same range as applicants 1.8 micron/min taught in Example 1 (300 Å/sec), therefore rendering results quite within the realm of expectations. Applicants also argue (page 1 of remarks) that the present invention creates a film that is monolithic, optically clear, etc – but none of these features are claimed in rejected claims 1-3 or 5.

In further arguments, applicants state that “controlling relative flow rates of the oxygen-containing balance gas and the tetraalkylorthosilicate determines concentration of the tetraalkylsilicate in the total gas mixture” (p4 of remarks). This argument is not supported/claimed in instant claims. The claim is written as comprising and contains an optional carrier gas. While any amount of balance gas would impact the tetraalkylorthosilicate concentration, instant claim includes no limitation that the amount of the balance gas would be the main determining factor in the TEOS concentration.

(For example process with a dominant carrier concentration and insignificant amount of oxygen-containing gas could read on instant claim as written).

In regards to double patenting rejection, applicant argues that Koinuma only teaches hydrogen as a balance gas. While Koinuma is not relied upon for this feature in the double patenting rejection, Koinuma teaches a “main gas” and a carrier gas (page 4, lines 12-16) as well as the fact that the reaction can occur in atmospheric air (page 4, lines 36-39). Applicant’s statement (pg 5 of reply, first paragraph) that Koinuma teaches hydrogen gas feed rates lower than 10 should be avoided is incorrect. While Koinuma does teach that it is preferred in order to control the oxygen-Si ratio in the resulting film, to control the hydrogen to at least about 10 times the silane source, Koinuma does not teach avoiding lower levels of hydrogen, specifically making the statement “Formation of a silica thin film is possible without supply of hydrogen gas.” It is clear that Koinuma is teaching different embodiments of the invention (with and without hydrogen).

While it was stated in other parts of the initial office action that Koinuma does not teach a TEOS concentration, as noted in the double patenting rejection, Koinuma does in fact teach a concentration of 33 to 10,000 ppm (derived from 0.01 to 2 sccm of silane in a total gas flow of 200 to 300 sccm, page 3, lines 22-43). The statement by the examiner that Koinuma does not explicitly *teach* the TEOS concentration is perhaps better worded that Koinuma does not explicitly *state* the concentration – the teaching is apparent in the document, as shown in rejections above.

Applicant's arguments in 2nd paragraph, page 5, are all addressed by comments above.

Regarding the applicants assertion that "any TEOS concentration range taught by Koinuma is not applicable...", Koinuma teaches that the total gas flow is 200 to 300 sccm, of which hydrogen is a relatively small portion (even 50 times the maximum amount of TEOS is 100 sccm, or at most 50% of the total flow) – leaving a consider portion of the total flow to be supplied by the "main gas". Since instant claim is "comprising", it allows for addition of additional gases and even includes an optional "carrier gas".

Applicant's further arguments over the double patenting rejection are moot – the unexpected result is not unexpected based on the similarity of the deposition rates of Koinuma and the instant application. Regarding applicant's amendment of the range from 2000 to 10,000 ppm to about 2200 to 10,000 ppm – Koinuma still teaches on this range.

New grounds of double patenting rejection

A second double patenting rejection of the same claims has been made in view of Babayan. Examiner asserts that 2000 ppm is "about" 2200 ppm.

In particular, given the broad range claimed by applicants, the difference between 2000 and 2200 ppm is not significant.

According to the MPEP 2144.05, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one

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skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.). "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re:Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

While the particular citations in the MPEP are pertaining more directly towards compositions of materials, it is reasonable to treat the composition of a gas in the same manner. Beyond that the 2015ppm (or 2003 as claimed by applicants) taught by Babayan is "about" 2200, the difference between 2003 and 2200 ppm in regards to this process would not produce results that are unexpected. Furthermore, Babayan teaches high deposition rates of 0.05 to 10 microns/minute (p11, lines 20-25), comparable to the applicants example 1 of 1.8 micron/minute.

While Babayan's teaching only reasonably applies to a 'lower portion' of claimed range, there is no expectation that there is a strong difference between a concentration of 2015ppm and 2200ppm. The applicants in fact claim the unexpected results as applied to concentrations of more than 2000 ppm [0007, summary of invention].

Claim rejections over prior art

Regarding applicants arguments of the 102 rejections over Babayan, arguments are moot – Babayan's teaching of 2003 ppm of TEOS is "about" 2200 ppm. No other argument against this rejection is made by applicant.

Regarding applicants arguments over the 102 rejections over Koinuma, 102 rejections are overcome in view of the applicant's amendment of claim to include a balance gas as noted in amended claim.

The 103 rejection over Koinuma has been amended due to applicant's amendment of claim 1. For reasons stated above relating to the double patenting rejection, the TEOS concentration range taught by Koinuma is appropriately applied to the rejections.

Regarding applicant's argument over 103 rejection in view of Gabelnick, examiner holds that the suggestion of a 2000 as a limit does not limit the range provided by Gabelnick's statement that the preferred concentration is not less than 10ppm. The suggestion of an upper limit does not negate the statement of use of **any** amount greater than 10ppm. Furthermore, original rejection was appropriate because an upper limit of 2000 ppm includes the point 2000ppm.

The amendment of instant claim 1 to "about 2200" does not overcome an obviousness rejection over Gabelnick, as 2200 ppm is included in the range not less than 10 ppm and, as stated above, 2000 ppm is "about" 2200.

Regarding applicants argument over Gabelnick in view of Koinuma, as explained above, Koinuma's teaching of the TEOS concentration range is applicable to the prior

art. Any argument of unexpected results is not merited due to the similarity of deposition rates produced by Koinuma and instant application.

Regarding arguments over 103 rejections of Yializis in view of Koinuma and Koinuma in view of Sloodman, the only argument is concerning the unexpected results, which has been previously addressed and is considered moot.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSEPH MILLER JR whose telephone number is (571) 270-5825. The examiner can normally be reached on Monday –Thursday, 8am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/JOSEPH MILLER JR/
Examiner, Art Unit 1792

/Timothy H Meeks/
Supervisory Patent Examiner, Art Unit 1792